

Matter

Chemistry Chapter 3.1, 3.3, 3.4

Objectives

Students will

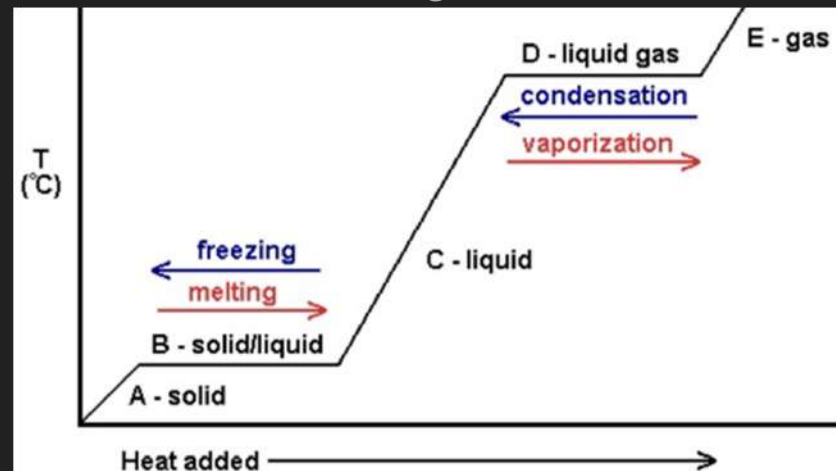
- Learn about matter and its three states.
- Understand the definitions of elements and compounds
- Learn to distinguish between mixtures and pure substances
- Learn to distinguish between physical and chemical properties
- Learn to distinguish between physical and chemical changes

“You have mass, you take up space, YOU MATTER!”

Matter: the “stuff” that makes up the universe -- has mass and occupies space.

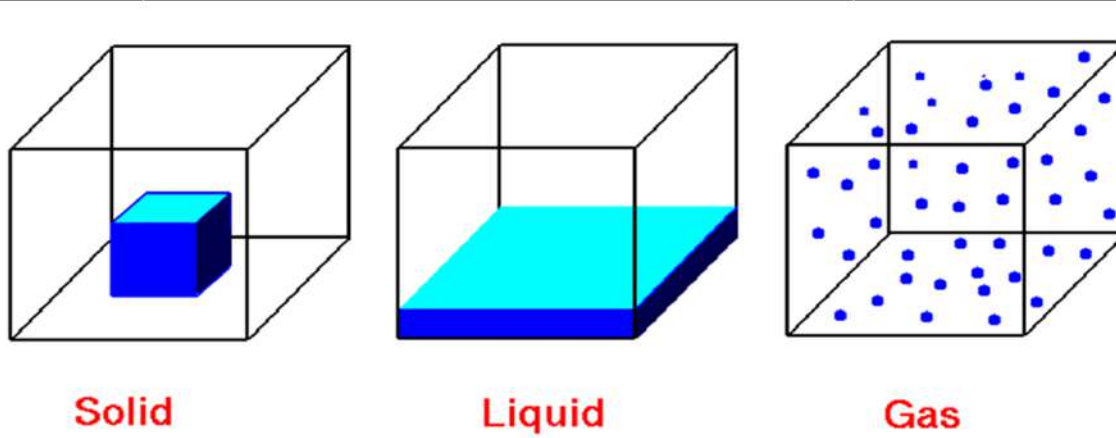
3 States of Matter: solid, liquid and gas

- State of matter depends on strength of forces among particles contained in the matter; stronger the forces, more rigid the matter.



3 States of Matter

State of Matter	Definition	Examples
Solid	Rigid; has no fixed shape and volume	Ice cube, diamond, iron bar
Liquid	Definite volume; takes shape of container	Gasoline, water, alcohol, blood
Gas	No fixed volume or shape; takes shape and volume of container	Air, helium, oxygen



Matter is made up of atoms (smallest unit of matter)

Elements: made up of the same atoms; cannot be broken down into other substances by chemical means Ex. Iron (Fe), Aluminum (Al), Oxygen (O), Hydrogen (H)

Compounds: substance composed of given combination of elements that can be broken down into elements by chemical means. Ex Water (H₂O), Carbon Dioxide (CO₂)

Mixtures: something with variable composition

Homogeneous (pure substance)
uniform composition ex. Saline
Solution, brass (Cu & Zn)

Solution

Heterogenous: mixture
containing regions of varying
compositions. Ex sand & water,
trail mix

Solution vs.
Heterogeneous Mixture



Salt water
solution
homogeneous
stable



Chocolate milk
h. mixture
heterogeneous
will settle

Solutions are made up of two parts :

-Solvent: the substance in larger amount;
what
does the dissolving.

- Solute: the substance being dissolved.

-Soluble: Able to dissolve and form a solution.
Only 1 phase in solutions

Ex. Salt Water (water=solvent; salt=solute)

“Like dissolves Like”

Polar solvents dissolve
polar solutes- not
nonpolar.

Nonpolar dissolves
nonpolar.



Solute



+ solvent

water

→

solution

solution

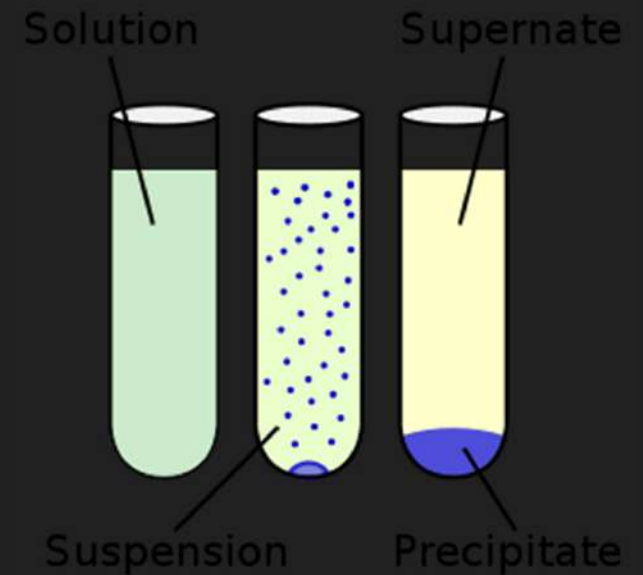
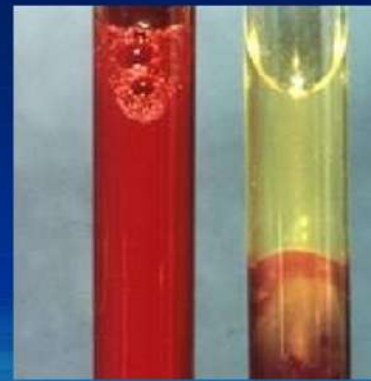


Suspensions

A **suspension** is a heterogeneous mixture in which solute-like particles settle out of a solvent-like phase some time after their introduction; insoluble particles suspended by liquid or gas

- 2 phases

- “Liquids that need to be shaken first before use”

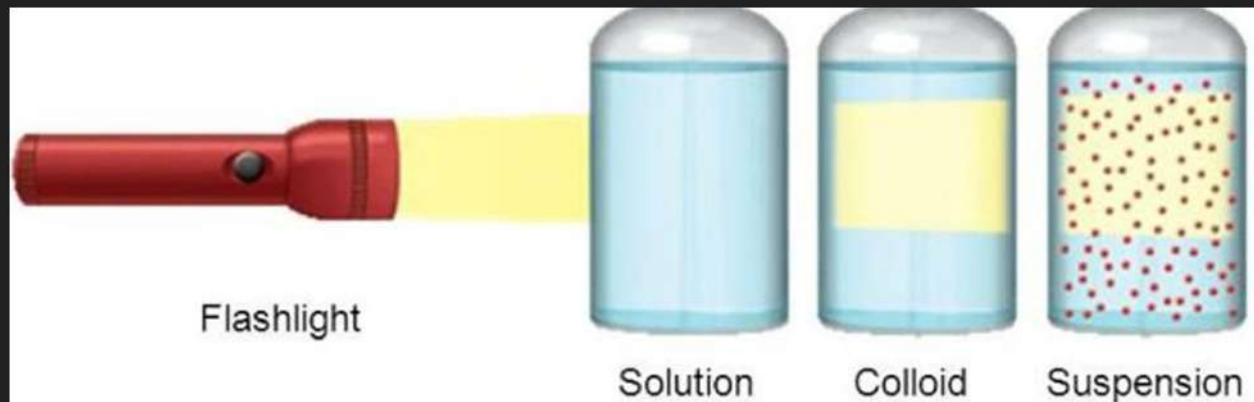


Colloids

A colloid is intermediate between a solution and a suspension.:Cloudy but uniform and homogeneous

Colloids can be distinguished from solutions using the Tyndall effect. - Light bounces off larger particles - light beam is visible.

Ex. smoky , foggy air; foams, milk, paints, blood



Physical & Chemical Properties

Physical Property: Characteristic that can be observed or measured without changing the identity of the substance.

Ex. melting point, density, state of matter

Chemical Property: relates to a substance's ability to undergo changes that transform it into different substances

Ex. flammability, rust on iron

Physical & Chemical Changes

A Physical change in a substance does not involve a change in the identity of the substance.

Ex. changes in state, color, cutting

Chemical change: one or more substances are converted into different substances – reactants & products

Sodium bicarbonate + acetic acid → carbon dioxide + water

Ex. combustion, decomposition

Recognizing Chemical changes: transfer in energy (heat, light), change in color, production of a gas, formation of a precipitate. (a solid that forms and settles out of a liquid mixture)

Separating Mixtures

Differences in physical properties can be used to separate mixtures.

Filtration- process that separates a solid from a liquid in a heterogeneous mixture.

Ex. colander, coffee filter, filtration paper

Distillation- a liquid is boiled to produce a vapor that is then condensed into a liquid.